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Alternate Frequency Tripling Schemes*

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Abstract

The current frequency converter design for the National Ignition Facility (NIF) consists of a two crystal converter with one doubler crystal and one tripler crystal. The design of this converter has been optimized for the NIF indirect drive mission which requires a temporally shaped laser pulse with a low intensity foot. A two crystal converter to optimize this pulse's conversion efficiency requires relatively thick crystals. Other proposed operating configurations include high power short pulses and high bandwidth SSD for both direct drive and indirect drive experiments. For these latter two operating scenarios, thick crystal converters can experience significant degradation in performance. Hence, it has been necessary to investigate alternate converter designs with high dynamic range and low sensitivity to bandwidth. These converter designs consist of three and four crystals. Their performance characteristics have been investigated using a new suite of frequency conversion codes. First results have shown that a three crystal converter with one doubler and two triplers produces high conversion efficiency and minimal intensity modulation for laser pulses with 150 GHz bandwidth and that a three crystal converter with two doublers has low angular sensitivity and high dynamic range.

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